THE POWER OF REDARC®

New vehicle technology can affect dual battery system's charging performance

Australia is following the trend occurring in the rest of the world regarding reducing pollution from new vehicles and from next year they must meet even tighter exhaust emission standards. New cars sold in Australia from 2013 must meet 'Euro 5' exhaust emissions standards and the tougher 'Euro 6' standard around 2017. As the standards have been becoming progressively tighter over recent years car manufacturers in their quest to meet the new standards have had to introduce new technology. They have designed the ECU to interconnect with the alternator and monitor electrical load. The ECU can control important engine functions via the CANBUS including injection duration and timing to better control emissions as loads vary. The ECU can even shut off the alternator in certain circumstances, adjust the alternator output voltage, and preload the alternator when the load changes. We refer to these alternators as ECU Controlled Variable Voltage Alternators.

For the most part, the changes made by vehicle manufacturers are aimed at increasing fuel efficiency, whilst reducing engine emissions. They can also frustrate the 4WD enthusiast however, particularly when faced with the ugly prospect of drinking warm beer from their fridge connected to their flattened auxiliary battery.

The new engine and alternator control technology we are experiencing however is nothing new. It is widely known that temperature compensating alternators have been used primarily in the Toyota range of vehicles fitted with D4D common rail diesels since early 2000's. It is also present in 2010 Toyota Kluger Petrol, BF Falcon and the subsequent models to name a few.

The rollout of this technology will render the common Voltage Sensitive Relay (VSR) virtually useless as was commonly used over the last fifteen years or so when adding a second or auxiliary battery to your 4WD vehicle. A smarter product is therefore required to ensure the auxiliary battery is 100% charged whilst coping with the fluctuations in voltage. It is important to note that current sensing in the vehicle's electrical system means that all additional electrical accessories must be grounded to the vehicle chassis or body, not to the main battery negative terminal.

South Australian automotive electronics accessories manufacturer, REDARC, has developed a patented solution. They have released a family of In-Vehicle Battery Chargers known as the 'BCDC' to charge auxiliary or house battery banks to 100% state of charge whilst on the move. They feature a multi stage DC-DC battery charger that is designed for installing in any 12 or 24 volt passenger, 4WD, truck, bus or marine electrical system. Another key feature of the BCDC In-Vehicle Battery Chargers is the voltage inverter technology that overcomes voltage drop when the auxiliary or house batteries are a considerable distance from the charging source as experienced in caravans and camper trailers, trucks and buses. Most critically though, to avoid the warm beer conundrum, they boost the low output voltages provided from ECU Controlled Alternators to your auxiliary battery.

The BCDC in-vehicle charger utilises voltage sensing of the main battery to determine when to charge the auxiliary battery and when to isolate the vehicle start battery. These voltages are researched by REDARC Engineers and have been selected to suit a wide range of vehicles, and for this reason there is the need to have a range of BCDC products to best suit all vehicle manufacturer charging system variations. The standard BCDC range will operate on voltage sensing alone in vehicles where the alternator voltages do not regulate lower than 12.7V at any time, such as standard Fixed Voltage Alternators and ECU Controlled Temperature Compensating Alternators.

The wider range of BCDC variants are applied in vehicles fitted with ECU Controlled Variable Voltage Alternators. The turn on and off voltages are sensed at different levels along with an ignition input to the charger, ensuring that the BCDC will charge the auxiliary battery to 100% while effectively protecting the main battery from over-discharge. The BCDC In-Vehicle battery chargers are available in 6 Amp, 20 Amp, 25 Amp and 40 Amp outputs. These current output options ensure there is a BCDC for all common load and battery charging requirements. The BCDC products incorporate specific battery charging algorithms to suit lead acid, Gel, AGM and Calcium batteries that have been designed by REDARC Engineers in conjunction with research commissioned by REDARC and carried out at The University of Wollongong.

TECH TIP

THE POWER OF REDARC®

New vehicle technology can affect dual battery system's charging performance

The BCDC1225 and BCDC1240 models also feature a MPPT Solar Regulator, which can be used to charge your auxiliary batteries from solar panels. The MPPT Solar charging algorithm extracts the maximum available power from your solar panels at any given time.

A common question is which model of BCDC can we use in our vehicle? Typically vehicles released from late 2011 onwards with common rail diesel motors are fitted with ECU Controlled Variable Voltage Alternators such as the Nissan Pathfinder, Nissan Navara, BMW X5 2010 onwards, Ford Ranger 2011 onwards, Mitsubishi Pajero 2012 onwards, Mazda Spirit, Mazda BT50 and various Range Rovers. Practically, the best way to determine your alternator's characteristics is to go for a drive with a voltmeter on the main battery.

Run the vehicle through varied driving conditions and record the minimum voltage found. The driving condition variations should include:

- Engine temperature (test whilst the engine is cold, and again whilst at operating temperature)
- Vary engine load (accelerate up an incline, and decelerate down declines)
- Vary electrical load (turn on the headlights and airconditioner and with all off)

The table below also helps identify the BCDC that you require for your vehicle.

Fixed Voltage Alternators (always 12.7V or more from alternator during driving)	Temperature Compensating Alternators (always 12.7V or more from alternator during driving)	ECU Controlled Variable Voltage Alternators (12.7V or less from alternator at any time during driving)
BCDC1206 (6 Amp model)	BCDC1206	BCDC1206
BCDC1220 (20 Amp model)	BCDC1220	BCDC1220-IGN
BCDC1225 (25 Amp model)	BCDC1225	BCDC1225-LV
BCDC1240 (40 Amp model)	BCDC1240	BCDC1240-LV

It is important to ensure that the correct BCDC is selected for your vehicle, application, and battery charging requirements. REDARC have developed a growing database of vehicles that determines the correct BCDC model to use for each vehicle.

If you have any questions or require help choosing the right BCDC for your vehicle, please contact the REDARC technical helpline, power@redarc.com.au or call the friendly technicians for free assistance on (08) 8322 4848.

TECH TIP